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Forest Health Protection

Forest Health Technology  
Enterprise Team

FHTET 97-04

April 1997



# Forest Health Technology Enterprise Team

## Mid-Year Progress Report FY 1997

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## **FOREWORD**

This document summarizes the mid-year progress of work undertaken by the USDA Forest Service's Forest Health Technology Enterprise Team (FHTET) during Fiscal Year 1997 (FY97). The FHTET comprises three offices, located in Morgantown, West Virginia; Fort Collins, Colorado; and Davis, California. The document is based on a compilation of tasks from all three offices.

This document was prepared by staff in the FHTET-Fort Collins (FHTET-FC) office.

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#### Task C: FHTET/DOE, Oak Wilt Biocontrol

All year-round FHTET actions were discussed in the 1996 FHTET Annual Report. FHTET's Oak Wilt program of Work planned a year for the short-term. Activities were focused on developing the use of Chitosan as a FHTET and non-patentary bioactive. This project will expand on the FHTET and FHTET/Monterey staff, incorporate new FHTET postdoctoral scientists (NAPIAP), and provide the necessary FHTET/Monterey staff and resources to the National Science Foundation and DOE programs. FHTET would be acting as a center of excellence for research on Oak Wilt, to expand knowledge and develop a strategy to manage Oak Wilt in the United States and to help biological control and mitigation efforts of several additional forest pests. The FHTET has recruited FHTET scientists, WHO International, and WHO staff, and other scientists and students from around the world to help develop this exciting developmental program. FHTET staff visited China and the International Primary Research Center with Chinese Ministry of Forestry and other groups to explore opportunities and research and future cooperation in research, technological, and other FHTET-related activities.

#### Task D: FHTET/DOE, Geometrids

This year, the FHTET/DOE, Geometrids program will be expanded. The DOE office of FHTET is now based at FHTET and the Geometrids program will be the primary focus of the FHTET/DOE. The Geometrids program will be expanded to include the Geometrids program at the University of California, Berkeley, and other groups to explore opportunities and research and future cooperation in research, technological, and other FHTET-related activities.



## **I. MANAGEMENT AND OPERATIONS**

### **PROGRAM AREA 1: MANAGEMENT**

#### **Task A: FHTET Implementation**

**Mid-year status:** The effort to strengthen the “enterprise” portion of FHTET activities continues. For FY 1997 program of work, the proportion of enterprise funds is estimated at 48% of the total FHTET investment in technology development. This is slightly above the 40% goal set in the proposal for establishing the Enterprise Team. FHTET FY 1996 Accomplishment Report and FY 1997 Program of Work were completed. A draft of the FHTET Strategic Plan is being developed.

#### **Task B: FHTET-FC Operations**

**Mid-year status:** FHTET-FC’s input to the FY 1996 Accomplishment Report was submitted in October 1996, as planned. A better accounting system was developed and is being used to better account for project expenditures. FHTET is working with the RMS Contract Officer to implement a transition from the current contractor to a new disadvantaged minority-owned (8A) contractor.

#### **Task C: FHTET-Morgantown Operations**

**Mid-year status:** FHTET-M sections were developed for the 1996 FHTET Accomplishment Report and 1997 Program of Work; provided input for the draft FHTET Strategic Plan; assisted in closing out the Davis unit of FHTET and incorporating on-going Davis projects and operations into FHTET-FC and FHTET-M; successfully incorporated former WO FHP pesticide activities (NAPIAP, IR-4, pesticide registration) into FHTET-M operations; conducted review of FHP National Steering Committees and STDP program. THTET is currently serving as member of steering committee for USDA biological control activities to develop a consolidated Departmental approach to both biological control and import/quarantine/release of potential biological control agents. The Enterprise Team coordinated FHTET activities with Regional/Area FH staff directors and staffs and solicited their input to help strengthen FHP technology development activities. FHTET staff visited China as part of an International Forestry team to meet with Chinese Ministry of Forestry and other groups to explore opportunities for continued and future cooperative efforts in biological control and other FHP-related activities.

#### **Task D: FHTET-Davis Closure**

**Mid-year status:** The Davis office of FHTET is now closed. All responsibilities carried out by the Davis office were transferred to Fort Collins, Morgantown, and MTDC. This task is thereby completed.

## **PROGRAM AREA 2: COMMUNICATIONS**

### **Task A: FHTET Communications**

**Mid-year status:** FHTET has been making significant progress in preparing materials and in presenting information that fosters active dialog with sponsors, customers, and partners. The Enterprise Team has been maintaining a communications plan as the backbone for setting objectives for a variety of communications activities. Production and dissemination of materials has been coordinated across all FHTET sites and project teams, and includes preparation of materials for dissemination through electronic networks.

#### **Products and delivery dates:**

1. Forest Health Technology Enterprise Team Updates: quarterly.
2. Revised FHTET Communications Plan: ongoing.
3. Maintenance and presentation of General FHTET slide program: ongoing.
4. Customer Outreach Plan and annual revision: drafts completed in February of 1997, will be reviewed and finalized in third quarter of fiscal year.
5. FHTET annual meeting agenda and support materials: planning sessions conducted in January and April, 1997; educational session of the annual meeting was arranged in March, 1997.
6. Synopsis of marketing activities by project teams (internal): gathered all activities conducted in calendar year 1996, and summarized them in a report in January, 1997.
7. Assessment of marketing effectiveness (internal): no progress.
8. ET promotional brochures and capability descriptions: drafted format for capability documents in November, 1996; produced marketing brochure in March, 1997.
9. ET general poster and/or display maintenance and presentation: overhaul initiated February, 1997.
10. Other FHTET communications materials, as identified in the FHTET Communications Plan: ongoing.

**PROGRAM AREA 3: SYSTEMS SUPPORT**

**Task 1: Computer Systems Support**

**Mid-year status:** FHTET purchased four X-terminals, additional memory for a memory-deficient workstation, and a high-capacity hard drive through the third round of IBM planning. The FY98 Information Resource Management plan has been completed. The Enterprise Team rendered extensive assistance to the Headquarters staff. Inventory of hardware and software is continuing.

## II. INFORMATION TECHNOLOGY AND ANALYSIS

### PROGRAM AREA 1: DATA ACQUISITION

#### Task A: Airborne/Spaceborne Sensor Evaluation and Development

**Mid-year status:** An evaluation report based on last summer's use of the digital CIR camera is in progress. Completion of this report has been delayed until June 1997 due to other activities. The Airborne Video Toolkit (AVT) automosaicking software has now been debugged, documentation has been completed, and the system is ready for distribution. Region 8 will be the first to receive the new software. The Manti-LaSal subpixel analysis project is continuing. Review of the initial product by Region 4 FHP and Manti-LaSal NF personnel indicates that the process shows promise for mapping spruce beetle mortality. An Interim Report has been published on the digital sketchmapping project. RSAC has produced a system requirements document which has been reviewed by the Aerial Survey Steering Committee. Demonstration by vendors is scheduled for the second half of this fiscal year.

#### Task B: Remote Sensing Support for Acquisition of Imagery

**Mid-year status:** Preparations for this year's Photo Program are underway. A letter has gone out to the Regions/Area soliciting work for this year. Final costs for the aircraft have been established with Region 2.

#### Task C: Remote Sensing Technology Transfer, Training, and Support

**Mid-year status:** Preparation for the course "Integration of Remote Sensing into Operational Programs" for FHP personnel is continuing. In response to feedback from FHP field personnel, the course has been postponed until September.

#### Task D: DFTM Trap Manufacture and Distribution

**Mid-year status:** A call letter was sent to the western regions on January 9, 1997. Orders for 6500 traps were received from R1, R2, R3, R4, R5, and R6. Materials for the traps were ordered and received, the purchase order to Foothills Gateway for fabrication was issued, and Foothills will complete shipment of traps to the field by June 1.

**PROGRAM AREA 2: INFORMATION ANALYSIS AND DISPLAY**

**Task A: Support for National Reporting Requirements**

**Mid-year status:** Work continues on the Insect and Disease Risk Map. This has turned into a much larger job than first anticipated; however, we expect to complete this project during the second half of this fiscal year. Work on the map of FHP activities on other federal lands and the map of suppression projects has been delayed, but these projects will be completed before the end of the fiscal year.

**Task B: Support for Off-Plot Forest Health monitoring**

**Mid-year status:** Aerial survey data for all Regions which have it has been collected and a national database has been constructed. 1996 data has been received from most Regions. A meeting of FHP GIS personnel and the Aerial Survey Steering Committee was held in Portland, Oregon, in November. The meetings provided valuable input on data standards, procedures, and the digital sketchmapping project. Presentations on the results of a review of the 1995 aerial survey data were made at the Forest Health Monitoring meeting in Dallas and the FHP Directors meeting in San Antonio. Recommendations were made at each meeting regarding opportunities to standardize the data. During the second half of this year, a standard database design will be completed. Maps for the 1996 Insect and Disease Conditions Report have been completed using the digital data where it is available. Maps of insect and disease activity in 1995 and 1996 have been produced at the request of the Intermountain West Forest Health Monitoring Region.

**Task C: GIS/Remote Sensing/Data Visualization Applications Support**

**Mid-year status:** Debugging of the Airborne Video Toolkit and development of User Documentation has been completed. The documentation will be published as a FHTET publication. Support has been provided to Region 8 in the use of the Airborne Video Toolkit software and hardware, and in use of the CIR digital camera. FHTET and RSAC have continued support to Region 4 and the Forest Research Institute of New Zealand in their use of the CIR digital camera. A schedule has been prepared for use of the CIR digital camera by FHP field units this summer. Support to the Dixie National Forest in the installation and use of SmartForest has continued. Support to Region 2 in the operation of the Fort Collins GPS Community Base Station has continued.

**Task D: Pest Model Output Display**

**Mid-year status:** The SmartForest visualization software was installed on 615 equipment on the Dixie National Forest in December 1996. The installed version was loaded onto a 615 server, which the users then ran from a 615 X-terminal. The installation team converted a dataset of stand boundary, digital elevation, and tree list information for a four-quad area to a format readable by SmartForest. That data was loaded and displayed by SmartForest. Users on the Dixie National Forest were given a demonstration on running SmartForest and were left with a SmartForest users guide and instructions for converting data.

### **PROGRAM AREA 3: INFORMATION MANAGEMENT**

#### **Task A: Support for Forest Health Projects and Display**

**Mid-year status:** Tracking of project progress was accomplished by Forest Health Coordinators with support from the Enterprise Team. The Enterprise Team provided data acquisition, storage, management, and reporting support for the Western Forest Health Initiative and the coordination for the Forest Health Display. All conference registrations, booth fees, and similar logistics have been managed and paid for in support of national program use of the display.

#### **Products and delivery dates:**

1. Databases and data management services for the Western Forest Health Initiative: data entry was completed November, 1996; the summary report was delivered to FHP-WO December 1996
2. Coordination of the Forest Health exhibit for four national conferences and other meetings as requested by regional coordinators; Forest Health display sent National Wildlife Management Institute meeting in March, 1997

#### **Task B: PTIPS Database Support**

**Mid-year status:** A new version of the PTIPS Database structure was completed in October. This new structure incorporated a merger between the ALLVEG database, which is primarily intended for collecting timber stand data, and PTIPS. A user's group meeting was held in February before the FVS Conference to present a brief overview of the new release, discuss any installation problems, and receive user input as to future reporting or database needs. Currently, PTIPS is an active participant in the Corporate Vegetation Database Project, which will lead to an agency structure for field-gathered, measured, and sampled plant data incorporating development efforts from ALLVEG, PTIPS, CSDS, ECIMIS, and others.

#### **Task C: PURS Database Support and Report**

**Mid-year status:** FHTET collected, entered, and verified data from the field. The final report for FY96 was completed and submitted to Headquarters staff.

#### **Task D: NAPIAP Database Support**

**Mid-year status:** The Financial Management and Information Systems (FMIS) database was reviewed and compared to the requirements for STDP and NAPIAP program management. It was determined that it would be most cost-effective to develop a database that focused specifically on the needs of STDP and NAPIAP program management. A prototype database has been developed and is currently being evaluated.

**PROGRAM AREA 4: SPECIAL TECHNOLOGY DEVELOPMENT PROGRAM**

**Task A: Technology Development Program Management**

**Mid-year status:** The STDP projects are important to a comprehensive technology development and transfer program by ensuring very pragmatic evaluations prior to adoption and long-term support. The Enterprise Team has been facilitating the review of steering committees, which has also resulted in suggestions for improvement of the STDP. The Enterprise Team has initiated a strategic planning process to identify long-term modifications to the program and to improve and clarify the relationship between STDP funded projects and longer-term Forest Health and agency technology development programs.

Program managers for NAPIAP and IR4 reviewed STDP projects and provided information useful to the STDP program administration. The Enterprise Team facilitated the review of STDP projects, and obtained recommendations for funding and program management from the Review Team (FHP Directors and two representatives from Research).

**Products and delivery dates:**

1. STDP requests for proposals, proposal distribution, economic analysis of proposals, and synthesis of review team recommendations for funding allocation: completed for September, 1996, through February, 1997.
2. Updated project report compendium and initiated coordination with steering committees to review the project reports for key findings which will be incorporated into a five-year summary of the accomplishments of the program: drafted March, 1997.
3. Coordinate program communications with steering committees and their members, especially to improve general knowledge of, and access to, project findings and results: ongoing.
4. Insert project records into the database, enabling improved review, summary, and coordination with NAPIAP projects: database design started in January, 1997.
5. Develop draft plan of work for coordinating STDP and NAPIAP (in collaboration with project III.7.a): outline drafted December, 1997; input received from the STDP Review Team in January, 1997.

## **PROGRAM AREA 5: MODELING**

### **Task A: Support and Maintenance of Insect and Disease Models**

**Mid-year status:** Introductory FVS sessions were held in Regions 2, 3, 4, 5, and 6, and an advanced session will be conducted in April. The ET staff worked cooperatively with FMSC to familiarize the trainees with all the models available. Entomologists and/or pathologists from each region provided the overview to the pest models and instruction on model usage. This was presented along with an awareness of the insects and pathogens that are common to that particular area. Assistance was provided by the ET staff to the instructors in preparing for each training session. We continue to increase the number of models available through the PC bulletin board and FTP site.

### **Task B: FVS Conference Coordination**

**Mid-year status:** A three-day Forest Vegetation Simulator (FVS) Conference was held February 4-6, 1997. The conference was prefaced and concluded by two half-day sessions: a developer's forum on Monday and a 'where do we go from here' question-and-answer period on Friday. Poster displays and software developments were presented on Wednesday evening. All aspects of the conference had good representation and attendance from National Forests, state forests, universities, and private industries with local as well as international interests.

### **Task C: Pest Model Interface Development**

**Mid-year status:** Model users have access to interfaces to FVS on the Data General and microcomputers (through both SUPPOSE and the PC version of the FVS submittal system). The Enterprise Team incorporated all the pest models into the SUPPOSE system as requested by trainers participating the 1996-1997 winter-season FVS- and pest model-training sessions managed by the Forest Management Service Center (FMSC). Because the FMSC completed construction of an FVS PC interface that does not provide access to the pest model extensions of FVS, the Enterprise Team continued development of a microcomputer-based interface that also enhances and fosters the continued analysis and design of the ecological components for the Suppose system.

#### **Products and delivery dates:**

1. Pest models incorporated with SUPPOSE: September, 1996, through March, 1997.
2. Microcomputer-based submittal system for pest models providing, at a minimum, the capability for users to interact with models to the extent possible in the Data General submittal system and to interchange pest model outputs with MS-WINDOWS Office Suite (Access, Excel, MS-Word, etc): development started and continuing.

## **PROGRAM AREA 6: QUANTITATIVE METHODS**

### **Task A: Methods to Simulate Landscape Processes**

**Mid-year status:** The overall objectives of this project are to determine the bio-statistical challenges of shifting from a stand-based modeling perspective to a landscape-level one, and to evaluate the opportunities that this broader perspective allows. A cooperative effort was begun with the Intermountain Station Missoula Fire Lab and the University of Montana to evaluate incorporation of process models into the FVS framework. The behavior of the multi-stand aspects of the Westwide Pine Beetle (WWPB) model was evaluated and documented. Computer software development that will integrate ArcView 3.0 and the Intermountain Station's Most Similar Neighbor software with the WWPB model is continuing.

### **Task B: Biometrics Analysis and Support**

**Mid-year status:** FHTET completed its primary responsibilities in an enterprise-fund project with the NE Area and the State of Vermont, compiling and analyzing forest health data. Model analysis for NEPA documentation was performed for a R2 FHP, Medicine Bow NF, State of Wyoming, and FHTET ecosystem management project. FHTET staff (Smith) is a member of the ID Team for this project. A joint BIA, R3 FHP, RM Station, and FHTET project was initiated to perform model calibration and validation for the mistletoe model of the CR variant of FVS. Analysis of the annosus portion of the Combined Root Disease Model was completed and documented, with results presented at the FVS workshop.

### **Task C: Values Determination Project**

**Mid-year status:** A joint project, partially funded by PSW Station, was initiated and substantially completed. The project examines the results of attitude and opinion surveys concerning fire and forest health issues over time. Preliminary results were presented at the Southern Forest Economics Workshop. Enterprise funded work for RM Station has progressed, with likely follow-on funding to be available. A cooperative study with CSU was completed.

## **PROGRAM AREA 7: DECISION SUPPORT SYSTEMS**

### **Task A: INFORMS Development**

**Mid-year status:** INFORMS version 1.0 was formally released with accompanying installation scripts/procedures and a User Guide on February 21, 1997. Partners Eric Twombly from the Wallowa-Whitman NF and Doug Rubel from the Forest Health staff in Pineville, Louisiana, are handling most implementation tasks. As of March 28, 1997, two operational sites have been established in Region 8, one site has been established in Region 2, and one site has been established in Region 6. In the next 12 weeks, there is a firm schedule to set up the following new user sites: one site in Region 1, two sites in Region 4, one site in Region 5, two sites in Region 6, three sites in Region 8, and two sites in Region 9. After that wave of implementation, more than a dozen other sites will be established through FY97 and early FY98, and INFORMS will thus be established at 1 or more sites in every FS region. FHTET staff are now working on version 1.1, which will include the integration of SUPPOSE (the FVS 615 interface). FHTET staff have contacted various FS staffs, including OSE, GIS COE, R8 MS (which manages the IMR), and IS&T in general as part of the process to secure national approval. New funding partners have emerged with the release of INFORMS, and FHTET's funding component for this task is now below 50 percent.

### **Task B: Integration of Forest Health Tools within INFORMS**

**Mid-year status:** Construction of a front-end utility to support graphical selection of stands as used in SUPPOSE is underway. This value-added utility will be integrated within INFORMS along with SUPPOSE. This activity should be complete in mid-summer, and the resulting product will appear in version 1.1 of INFORMS, scheduled for release in late summer. Alan Ager now has access to INFORMS at the Wallowa-Whitman NF via the wide-area network, and has begun to reengineer UPEST risk-and-hazard-rating models for integration into INFORMS. Forrest Oliveria is negotiating with various universities and regional staff to secure funding and personnel to reengineer the Decision Key (a set of hazard rating models) for installation onto 615 and into INFORMS. Doug Rubel is reengineering SPBIS (southern pine-beetle information system) for installation onto 615 and into INFORMS, and has consulted within FHTET staff on several occasions. The Rulebase Toolkit software is in the final stages of refinement, and will be delivered as part of INFORMS with version 1.1. A draft User Guide and draft System Documentation is now available for the Rulebase Toolkit. FHTET staff will refine these documents into final drafts through FY97 with R8 FHP funding. The Ouachita NF has funded reengineering of three resource models (wildlife, sedimentation, economic models) onto 615 and specifically within INFORMS. Two models are now operational within INFORMS on that forest, and the third is under development. Preliminary analysis has been conducted on integration of SmartForest within INFORMS. The R1 insect and pathogen successional queries will be reengineered to work within INFORMS in the second half of FY97. INFORMS version 1.0 includes a link to the Forest Health Home Page via the wide-area network. FHTET has been approached by various project staffs, including TIMS, TSPAS, and the Decision Protocol, concerning opportunities to tie those applications to INFORMS. EM is funding a prototyping effort to explore integration of the Decision Protocol. This activity is active and scheduled to be completed in August.

**Task C: Documentation of Landscape Assessment Methods**

**Mid-year status:** First-half FY97 activities have been somewhat limited. Michael Marsden (Statistician), Lowell Lewis (GIS support), Kaye Shewmaker (Oracle database support), and Lance David (modeling support) have expended approximately eight weeks of labor (combined) to finalize data management issues, data summary issues, and to facilitate self-sufficiency by R1 staff in the use of the methodology. Meetings were held with Sue Frankel and Ellen Goheen to orient them to the mechanics and benefits of this assessment technique. FHTET provided input to Sue, Ellen, and Sue Hagle, in the development of a follow-up Technology Development Proposal (TDP). Unfortunately, that proposal was not approved for funding. In the later half of FY97, FHTET will review the existing set of Oracle scripts and related processes that support this methodology in R1, and subsequently reengineer these scripts and procedures for eventual integration into IN-FORMS. With the rejection of the TDP, FHTET will focus on finalizing the project in R1, including production of more generic scripts and procedures that will support long-term use of the data and methodology within R1.

**PROGRAM AREA 8: INFORMATION DISTRIBUTION**

**Task A: Internet and Intranet Services**

**Mid-year status:** Provided assistance to field units in putting their Conditions Reports on the Work-Wide Web. Four regions' reports are now available on the Web, linked to the Forest Service's Forest Health web site maintained by FHTET. Region 4 is currently using the FHP/FHTET web server to store and serve its Conditions Report.

### III. TREATMENT TECHNOLOGY

#### **PROGRAM AREA 1: DECISION-SUPPORT SYSTEMS FOR PEST CONTROL**

##### **Task A: SpraySafe Manager—Aerial Application Decision-Support System**

**Mid-year status:** A meeting between FHTET representatives and New Zealand's Forest Research Institute scientists was held in Rotorua, New Zealand in October, 1996. An FHTET consultant is planning to be in Rotorua for four weeks in April, 1997, to participate in further development of SpraySafe Manager.

##### **Task B: Field Meteorology Handbook for Resource Managers**

**Mid-year status:** Progress is being made in the preparation of the handbook. No additional contribution from FHTET to the project is anticipated. Jack Barry will continue his involvement in the project as a volunteer.

**PROGRAM AREA 2: ENVIRONMENTAL FATE STUDIES**

**Task A: Dispersion and Fate of *Bt* in Forested Canyons**

**Mid-year status:** The journal manuscript documenting the result of this project is being prepared by Jack Barry as a volunteer. FHTET will assist the project team with preparation of color graphics and other illustrations.

**Task B: Environmental Fate of *Bt* Spores in Wasatch Mountains**

**Mid-year status:** FHTET staff met with cooperators from Weber State, the U.S. Army, and Region 4 FHP. The original project objective (i.e. analysis and collection of field samples) was put "on-hold" until preliminary evaluation of the methodology used to distinguish among *Bt* variants. The FHTET budget was revised downward from \$25,000 to \$10,000 for FY97. A study plan for FY97 activities is in preparation, and continuation of project beyond FY97 is dependent on FY97 results.

### **PROGRAM AREA 3: MTDC FOREST HEALTH PROGRAM**

#### **Task A: Meteorological Instrumentation Support in FHP Operations**

**Mid-year status:** Two previously collected data sets (Wind River and Mormon Ridge) are being analyzed. Instrumentation will be deployed this FY in the support of two large herbicide application projects in R1 this fiscal year.

#### **Task B: Spray Drift Mitigation**

**Mid-year status:** Various efforts are on-going in this area. DuPont has sent MTDC \$5,000 to develop a training video on the relationship between meteorological conditions and off-target drift of pesticides. Harold Thistle was invited to attend the Spray Drift Coalition meeting in Washington, D.C. This group is developing regulations for pesticide application and is looking for technical guidance. MTDC has sent \$4,000 of funding to Allwine Environmental and \$3,000 to Battelle Pacific Northwest Laboratories to utilize the VALDRIFT model in applied pesticide drift scenarios. A report was published on the optimization of pesticide application.

#### **Task C: Pheromone Application Support**

**Mid-year status:** Activity in this project has been directed toward improving aerial application/ dispensing equipment for viscous, tacky pheromone carriers. Andy Trent traveled to Mission, Texas, to see APHIS equipment used to carry out this type of application. This project is being closely coordinated with Dick Reardon (FHTET-Morgantown). Andy will aid in the evaluation of proposed equipment designs.

#### **Task D: DGPS Aircraft Guidance**

**Mid-year status:** The focus of this project this year is a test and demonstration performed in Harrisonburg, Virginia, to evaluate the interface between onboard aircraft guidance systems and FS GIS. The test was planned and a published test plan was distributed to system manufacturers. The tests occurred and were attended by approximately 30 people from FS, state cooperators, the private sector, and other Federal agencies. A final report on this work will be published. Harold Thistle participated in aerial applicator training for the Oklahoma Association of Aerial Applicators in Oklahoma City in January. All direct costs were reimbursed by OAAA. This type of activity is both entrepreneurial and builds goodwill and technical competence in the public at large.

#### **Task E: Seed Orchard Sanitation**

**Mid-year status:** Activity in this project has focused on two machines. A small vacuuming unit was purchased at the Oconto River Seed Orchard last fall. Orchard ground surface conditions have not been correct to extensively test this machine yet. An effort is under way to evaluate a rake type machine that uses rubber fingers to collect debris. These machines were developed for golf courses and may be very useful in this application.

**Task F: Engineering Services**

**Mid-year status:** The primary activities in Engineering Services so far this fiscal year have been report writing and administrative. A final report has been written on the stationary tree sprayers and an interim report has been written on electronic sketchmapping. An engineering design to use the stationary tree sprayer system on multiple trees has been developed by Tony Jasumback and was sent to Larry Barber in Asheville, North Carolina. On the administrative side we have prepared a preliminary cost/benefit analysis of the program, cooperated on development of the FHTET marketing brochure and on the FHTET five-year accomplishment report. The FY96 MTDC/FHP Accomplishment Report was also published this year. The transition of sponsors has caused substantial activity in the administrative area which has included meetings attended by Harold Thistle in Ft. Collins (John Steward also attended this meeting) and in Davis, California. MTDC has also been working actively to encourage ideas for the FHP/MTDC program of work from FHP field personnel.

**Task G: Model Testing and Evaluation**

**Mid-year status:** The work on this project this year has focused in two primary areas. The first is to establish a program of work to develop a model to predict in-canopy dispersion of pheromone. The second is to develop a real-time drift indicator based on simple modeling approaches. Harold Thistle traveled to Wind River, Washington, in October to discuss work performed last August in support of pheromone dispersion model development. Direct costs were paid by the University of Washington. Harold Thistle traveled to Corvallis, Oregon, in October, and MTDC has provided \$7,000 of funding to Dr. Warren Webb of Oregon State University to reduce and analyze in-canopy plume spread data. Pheromone dispersion modeling will be proposed next year as a project in the FHP/MTDC program of work. The second area is the development of real-time modeling techniques. Discussions have been held with various DGPS Aircraft Guidance system manufacturers along these lines. In support of this work a demonstration of wing mounted meteorological sensors was held in October in Missoula, Montana. Accurate real-time meteorology is critical to the success of this concept. Harold Thistle also met with representatives of the Army and Air Force in Reno, Nevada, in December to discuss on-going Air Force work along these lines. A book chapter was also published on this project.

**Task H: Graphical Enhancements and Operation Systems Updates**

**Mid-year status:** This project has been inherited this year from the Davis Office. The main thrusts of this are the development of a new version of FSCBG (Version 5) and the movement of the FSCBG model into a Windows sub-system with Windows menus.

**Task I: FSCBG System and User Group Management**

**Mid-year status:** This project was also inherited this year from the Davis Office. At this time, this work is conducted by Continuum Dynamics, Inc. under contract to FHTET. Since the CDI arrangement is in place this FY. It is proposed that this project be terminated. The project budget will be distributed to the DGPS Aircraft Guidance in Aerial Spraying, Spray Drift Mitigation and will be used to initiate a new project to investigate and develop spray card analysis techniques.

**PROGRAM AREA 4: □ BIOPESTICIDES**

**Task A: QA/QC Standards for Formulations of Semiochemicals**

**Mid-year status:** Funds have been transferred to the Agricultural Research Service (ARS) to cover the cost of laboratory technicians, facilities, and equipment. A preliminary list of cooperators and products has been drafted. Preliminary QA/QC standards have been drafted and submitted for in-house review.

**Task B: 4-AA to Protect Individual Trees from Southern Pine Beetle**

**Mid-year status:** FHTET initiated discussions with 3-M Canada for development of an appropriate release capsule for 4-AA, received preliminary lab release data for the capsule, and is developing a study plan for field activities.

**Task C: Develop Semiochemicals for Operational Use**

**Mid-year status:** FHTET has begun preliminary evaluation of pheromone application technology for flakes/beads with MTDC, Harold's Flying Service, Schiffer Flying Service, K&K Aircraft, and APHIS Aircraft Operations. A meeting has been scheduled week of April 14 with Thistle, Reardon, Daterman, and Webb to discuss pheromone plume model.

**Task D: Analysis and Environmental Fate of Insect Growth Regulators**

**Mid-year status:** Several techniques for recovery and quantification of Mimic from leaf, litter, and soil samples were evaluated in the laboratory. All field-collected leaf, litter, and soil samples (collected from 1994 through 1996) are now processed and ready for analysis.

**Task E: Optimize Nucleopolyhedrosis Products for Operational Use**

**Mid-year status:** The study plan has been prepared for ground application evaluation of several formulations applied by ground equipment. American Cyanamid alerted EPA that it plans to cancel its gypsy moth NPV registration, as the company is no longer involved in tissue culture of gypsy moth NPV.

**Task F: Silvicultural Prescriptions for Gypsy Moth—Demonstration**

**Mid-year status:** The final report is being prepared.

**Task G: Development of *Entomophaga maimaiga* for Operational Use**

**Mid-year status:** FHTET has made preliminary contacts with EPA and Ann Hajek (Cornell University) concerning registration of gypsy moth fungus. A methodology is being evaluated for laboratory production of *Entomophaga maimaiga*. Additional field efforts have been initiated concerning potential non-target impacts of fungus to other Lymantriidae.

## **PROGRAM AREA 5: BIOLOGICAL CONTROLS**

### **Task A: Natural Enemy Complex for Hemlock Woolly Adelgid**

**Mid-year status:** The predator *Pseudocymnus* n. sp. is being reared for a second year release in Connecticut. A backup colony of *Pseudocymnus* is being established at New Jersey Department of Agriculture rearing facility. A survey for natural enemies of hemlock and balsam woolly adelgids has begun where these species co-occur.

### **Task B: Natural Enemy Complex for Mile-A-Minute Weed**

**Mid-year status:** FHTET has completed preliminary contacts with State Departments of Agriculture, National Park Service, APHIS, ARS, et al. Establishment of plots in West Virginia, Delaware, Maryland, Pennsylvania, and Virginia has begun. The ARS laboratory in Beijing is continuing plot establishment, field survey, and collection of natural Mile-a-Minute weed enemy associates in People's Republic of China.

### **Task C: Impact of Exotic Natural Enemies Released in North America on Non-Target Lepidopteran Hosts**

**Mid-year status:** A graduate student has been hired for the project, and a literature review has been completed focusing on specific model systems. A study plan is now being prepared.

### **Task D: Biological Control Program for Woodwasp in South America**

**Mid-year status:** A workshop has been completed and training provided to forest managers from several South American and African countries. Parasites from Australia were shipped to Brazil and being reared in EMBRAPA facility. Parasite release is planned for September, 1997.

### **Task E: IPM Program for Pine Shoot Beetle**

**Mid-year status:** A draft compliance agreement for Christmas tree growers completed and sent out for review. This will provide a component for initial Integrated Pest Management (IPM) program. Laboratory studies continue concerning interaction of native and exotic predators. Additional exotic natural enemies are being collected by ARS for the APHIS Laboratory in Niles, Michigan.

### **Task F: Biological Control of Weeds in the Western U.S.**

**Mid-year status:** Funds were transferred to R1 Forest and Rangeland Management to complete a video "how-to" guide for collecting, transporting, distributing, and monitoring biological control agents for invasive exotic plants.

### **Task G: Cooperative Biological Control Projects**

**Mid-year status:** Collections of gypsy moth parasite *Rogas indiscretus* continue in India. A laboratory colony of *R. indiscretus* was established at ARS Laboratory in Newark, Delaware, and 3,000 cocoons were produced for release in 1997. Field releases of *R. indiscretus* are planned at one site in Pennsylvania and one site in Wisconsin.

### **Task H: Mycorrhizae to Suppress Root Diseases on Conifers in Nurseries**

**Mid-year status:** Laboratory evaluations were completed using several mycorrhizae collected from State nursery in Pennsylvania. Initiation of greenhouse evaluations were based on results from these laboratory evaluations.

Task I: Natural Enemy Complex for Mealybug in China

**Mid-year status:** Shipment of parasites from USA to People's Republic of China (PRC) continue. The study has been extended for two years, with additional funding provided by PRC.

Task J: Natural Enemies of Cypress Aphid in Kenya

**Mid-year status:** Parasite collections continue at a very low level in the US. None of the parasites previously collected in US have become established in Kenya.

Task K: Develop an Integrated Management System for Cogongrass

**Mid-year status:** FHTET met with cooperators at University of Florida, Florida Department of Agriculture and Consumer Services, and Withlacoochee State Forest, a cooperative agreement has been completed, and a study plan is being prepared. Field plots will be established in June of this year.

Task L: Biological Control of Weeds Workshop

**Mid-year status:** Preliminary discussions were held with the National Park Service about co-hosting a workshop in the East. A second round of discussions will be held the week of April 7th at the Exotic Pests of the Eastern Forests Conference. Preliminary discussions were held with Jim Olivarez and George Markin for hosting a similar workshop for the West. Follow-up discussions will take place between Dick Reardon, Olivarez, and the Oregon Department of Agriculture.

Task M: Dyer's Woad Control Demonstration

**Mid-year status:** FHTET staff met with representatives from Utah State University and R4 cooperators: the participating agreement is being revised (given a redirection of project focus in FY97), and a study plan for the five-year effort is being prepared.

Task N: Vegetation Management Options for Enhancing Ecosystem Health

**Mid-year status:** No progress to date. Harold Thistle and Dick Reardon are scheduled to meet during the week of April 14 with Michael Newton (Oregon State University) to clarify this effort (a study plan was never prepared for this project).

**PROGRAM AREA 6: NON-TARGET IMPACTS**

**Task A: Impacts of *Bt* and Gypsy Moth Defoliation**

**Mid-year status:** Treatments of *Bacillus thuringiensis* will be applied to plots located on the George Washington and Monongahela National Forests by May. Preparation of NEPA documents and EAs are completed. A peer review of this study will be completed by June 4, 1997.

**Task B: Conophthorus Behavioral Chemicals for Pine Seed Crop Protection**

**Mid-year status:** Study plans are being written, methodology developed, and selection of prospective study sites are being accomplished in a timely manner.

**Task C: Development and Assessment of *Dioryctria abietivorella* Pheromones**

**Mid-year status:** Study plans are being written, methodology developed, and selection of prospective study sites are being accomplished in a timely manner.

**Task D: Effect of Prescribed Burning on Nontarget Organisms**

**Mid-year status:** Study plans are being written, methodology developed, and selection of prospective study sites are being accomplished in a timely manner.

**Task E: Evaluation of Forest Management Strategies on Ponderosa Pine**

**Mid-year status:** Study plans are being written, methodology developed, and selection of prospective study sites are being accomplished in a timely manner.

**Task F: Image Archive of Selected Forest Lepidoptera**

**Mid-year status:** Cost-sharing arrangements have been discussed with R8 and FHP. Preliminary discussions have been held covering development of a CD-ROM containing images of rare and endangered species in forest ecosystems.

**PROGRAM AREA 7: MANAGEMENT OF PESTICIDE PROGRAM**

**Task A: Management of NAPIAP**

**Mid-year status:** Regions, Stations, and the Northeastern Area submitted 21 new proposals for Fiscal Year 1997 funding under the National Agricultural Pesticide Impact Assessment Program (NAPIAP). Forest Service NAPIAP FY 1997 funding consists of \$354,900 from USDA Agricultural Research Service, and \$361,000 from USDA-FS-FHP, for a total of \$715,900. Funding needed for continuing NAPIAP studies is \$270,000, leaving \$445,900 to support new 1997 proposals.

An interdisciplinary team of agency and department experts was empanelled to review and rate the new proposals and recommend a program for FY 1997 funding. The team met on January 15-16, 1997, and recommended the twelve highest-ranked new studies be funded for FY 1997. A notification letter was sent out to Regions, Stations, and Area.

**PROGRAM AREA 8: MANAGEMENT OF PESTICIDES**

**Task A: Management of Pesticide Programs**

**Mid-year status:** MCH product chemistry has been submitted by Aldrich. Registration will be complete pending an EPA review of acute toxicology studies. Reregistration of Gypchek and TM-Biocontrol is on target. A one month detail to the Biopesticides and Pollution Prevention Division of EPA was completed by October 1996. Review of biopesticide registration status for forestry utilization is ongoing.

## NEW PROJECTS

### Oak Wilt Biocontrol Project

Focus: To augment levels of *Gliocladium roseum* and *Trichotecium roseum* on oak wilt mats in order to decrease or eliminate the probability of overload transmission of the oak wilt fungus.

Cost: FY97 - \$8,000.

Cooperators: Jennifer Juzwik (USDA Forest Service, FIDR, St. Paul, MN), Joe O'Brien (USDA Forest Service, FHP, St. Paul, MN).

### Field Guides to Forest Geometrids

Focus: To prepare field guide to approximately 150 of the most common forest geometrids, and to begin preparation of a field guide to rare and endangered species in forest ecosystems.

Cost: FY97 through 8/15/98 - \$9,333.

Cooperators: David Wagner (University of Connecticut), Keith Douce (University of Georgia).





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